REMARKS

Applicants request reconsideration of the outstanding rejections in view of the comments set forth herein and in the Amendment and Response Pursuant to 37 C.F.R. § 1.111, filed December 7, 2006, said comments being incorporated by reference in their entirety herein.

Claims 41 and 48 have been amended to clarify that they are transformed with a microbial endoglucanase. Support for the amendments can be found in claims 35 and 42 and the claims as previously presented.

Claims 35 and 43 have been amended to specify that the promoter is a promoter that determines a spatial or temporal expression pattern for the microbial β-1,4-endoglucanase. Support for this amendment can be found on page 21, lines 25 – 29, in the section entitled "Promoter Selection".

Claim 42 is amended to remove "vacuole". Support for this amendment can be found on pages 23 – 24 of the present specification under the section entitled "Targeting of the Gene Product Within the Cell".

New claims 49 and 50 where added to reflect the amendment in claim 42. Support for this amendment can be found in the previously presented claims.

No new matter has been added by these amendments. Claims 35-50 are pending.

Claim Objections under 35 USC § 112, second paragraph

Claims 41 and 48 were objected to under 35 USC § 112, second paragraph, in the Advisory Action mailed January 4, 2006, for allegedly being unclear as to whether they comprise the nucleic acid or if they are transformed with some other nucleic acid. Applicants have amended claims 41 and 48 to ensure the claims are clear as to comprising an endoglucanase. Applicants request reconsideration and withdrawal of this objection in light of the current amendments.

Claim Rejection under 35 USC 112, first paragraph

Previously pending claims 8-9, 14,20-23 and 30-34 were rejected under 35 USC 112, first paragraph, as allegedly containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed invention at the time the application was filed.

Current claims 35-50 define subject matter which is described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors had possession of the claimed subject matter at the time the application was filed.

As discussed in previous Responses, to fulfil the written description requirement it is not necessary in a patent application to describe information and facts known to those skilled in the art or list every possible endoglucanase known at the time of the invention.

In the Advisory Action of January 4, 2007, it is stated that the references of Gilkes and Henrissat will not be considered. In light of this Request for Continued Examination, Application request reconsideration of this decision and respectfully ask the Examiner to consider both Gilkes and Henrissat and the following remarks.

Applicants would like to draw the attention of the Office to three references. As previously discussed and incorporated by reference in the present application, Jung *et. al.* describes endoglucanases and in particular endoglucanases from *T. fusca*. (Jung, *et. al.* (1993) Appl. Environ. Microbiol. 59:3032-3043. Jung *et. al.* is discussed on page 4 and page 14 in the present specification and is incorporated by reference in the present specification on page 14, lines 12-13.) In Jung, *et. al.* on page 3032, the last paragraph of the introduction, there is a discussion of the E1, E2, E4, and E5 genes. Jung reports that "(e)ach *T. fusca* cellulose is a member of one of the known cellulose families. The genes in each family (14, 17) share similarities in the protein sequences of their catalytic domains but do not necessarily have similar enzymatic activities." Jung goes on to say that E1 is a member of family E, E2 is a member of family B and E5 is a member of family A.

Applicants would now like to draw the attention of the Office to the references cited in the previous quote as (14, 17) and included in the Supplemental Information Disclosure Statement, submitted herewith. Reference 14 is Gilkes, *et. al.*, (1991), Microbiol. Rev. 55:303-315, entitled Domains in microbial ß-1,4-endoglyanases: sequence conservation, function, and enzyme families. Reference 17 is Henrissat, *et. al.*, (1989) Gene 81:83-95, entitled Cellulase families revealed by hydrophobic cluster analysis.

Gilkes, *et. al.* describe the structural elements of cellulases and xylanases, including the structure of endoglucanases (EC 3.2.1.4). In particular, Figure 1 on page 307, provides an alignment of amino acid sequences of bacterial cellulose binding domains and their conserved regions, Table 5 on pages 309-310 provides a list of endoglucanases, broken out by family, with references for each sequence, and the section entitled "Structural Elements in Cellulases and Xylanases" on page 303 gives an in depth description of the structural elements of endoglucanases. Gilkes, *et. al.* describe in detail the sequence, structure and function of microbial endoglucanases.

Henrissat, *et. al.* uses hydrophobic cluster analysis to describe and classify EC 3.2.1.4 endoglucanases, as well as cellobiohydrolases (EC 3.2.1.91). Table 1 on page 85 provides a list of endoglucanases (abbreviated as EG on the table) from a variety of sources as well as references to their sequences. Figures 1-5 provide HCA plots describing conserved domains of cellulases from specific families. Henrissat, *et. al.* describe in detail the sequence, structure and function of microbial endoglucanases.

Clearly, the structure, sequence and functional domains of endoglucanases (EC 3.2.1.4) were well known and described in the art available at the time of filing of the present application and in the present application itself. Therefore, the specification provides sufficient written description to support the present claims.

Applicants submit that these remarks and the currently pending claims overcome this rejection and request its withdrawal.

Claim Rejection under 35 USC 112, first paragraph

Previously pending claims 8-9, 14, 20-23 and 30-34 are rejected under 35 USC 112, first paragraph, as allegedly being not enabled by the specification for all ß-1,4-

endoglucanases. In particular, the Office Action suggests that "(t)he instant specification fails to provide guidance for a representative number of other nucleic acids encoding cellulases . . ." Please see page 6 of the Office Action mailed July 17, 2006.

Applicants respectfully traverse. Claims 35-48 are to transgenic plants comprising a nucleic acid encoding a microbial β-1,4-endoglucanase (EC 3.2.1.4). The relevant inquiry for determining whether the scope of the claims is commensurate with the specification is "whether the scope of enablement provided to one of ordinary skill in the art by the disclosure is such as to be commensurate with the scope of protection sought by the claims." In re Morre, 439 F.2d 1232, 1236 (CCPA 1971). "A patent need not teach, and preferably omits, what is well known in the art." Hybridtech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 231 USPQ 81 (Fed. Cir. 1986), Cet. Denied, 480 U.S. 947 (1987).

In the Advisory Action of January 4, 2007, it is stated that the references of Gilkes and Henrissat will not be considered. In light of this Request for Continued Examination, Application request reconsideration of this decision and ask the Examiner to consider both Gilkes and Henrissat and the following remarks.

As discussed in the above written description section of this response, the structure, function and sequence of numerous microbial endoglucanases was known and referenced in the specification. Please see in particular page 4 of the specification, as well as, the Gilkes, *et. al.* and Henrissat, *et. al.* references. Because endoglucanases are well known in the art, not every endoglucanase needs to be included in the specification. In addition, examples A1 to C13 in the present specification provide numerous examples of expression constructs comprising a nucleic acid encoding members of three representative families of endoglucanases, E1, E2, and E5. Applicants have provided sufficient scope of enablement to one of ordinary skill in the art when taking into consideration the scope of protection sought by the claims. Therefore, the presently pending claims are enabled for transgenic plants comprising a nucleic acid encoding a microbial β-1,4-endoglucanase.

The Office Action, mailed July 17, 2006, also rejects Claim 14, as not enabled, because the specification, allegedly, teaches one source of thermostable microbial β-

1,4-endoglucanases, from *T. fusca*, and "does not teach how to make other thermostable microbial β-1,4-endoglucanses". See page 7 of the Office Action mailed July 17, 2006.

Applicants respectfully traverse. *T. fusca* is a thermophilic soil bacterium. Jung *et. al.* compared the sequences of E1 and E4 to other cellulases. Similarities and differences between endoglucanases from a thermophilic bacterium and other non-thermophilic bacteria were described. Please see pages 3039 to 3041, Figure 7 and Figure 8. This description of the structural differences between an enzyme isolated from a thermophilic organism and an enzyme isolated from a non-thermophilic organism would enable one of skill in the art to recognize thermophilic enzymes.

Applicants submit that the currently pending claims overcome this rejection and request its withdrawal.

Claim Rejection under 35 U.S.C. § 103

In the Final Office Action mailed July 17, 2006, claims 8, 14-15 and 21-23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Van Ooyen, et. al. (US Patent 5,705,375, the '375 patent) in view of Lao, et. al. (1991, J. Bacteriol. 173:3397-3407). The Office acknowledges that Van Ooyen, et. al. do not disclose plants transformed with a nucleic acid encoding an endoglucanse. However, the Office contends that Lao teaches gene encoding the *T. fusca* E2 and E5 β-1,4-endoglucanases and that it would have been obvious to one of ordinary skill in the art to "modify the method of expressing microbial genes in plants as taught by Van Ooyen et al, to the nucleic acids encoding *T. fusca* described in Lao et al." (Page 9 of the Office Action mailed July 17, 2006) The Office further contends that "one of ordinary skill in the art would have been motivated to do so because of the suggestion of Van Ooyen et al to express microbial β-1,4-endoglucanases in plants (column 4, lines 11-36." (Page 9 of the Office Action mailed July 17, 2006)

The Advisory Action mailed January 4, 2007 maintains this rejection.

Applicants respectfully submit that the Office has not met its burden of establishing a *prima facie* case of obviousness over Van Ooyen in light of Lao. The currently amended claims specify that the promoter is a promoter having a temporal or

spatial expression pattern. Van Ooyen does not provide motivation to express a β-1,4 endoglucanase in a temporal or spatial manner.

Expression of cellulose degrading enzymes would be counterintuitive in organisms containing cellulose, such as plants. Please see page 5, the last paragraph before the Summary of the Invention, in the present specification. Van Ooyen does not address or discuss either this problem or methods to overcome this problem. Therefore, there would have been no motivation to make the proposed modification.

The enzymes disclosed in Van Ooyen are involved in modifying polysaccharide composition, in particular, degradation of starch. (See Col. 3, lines 11-39 of the '375 patent.) The present application describes enzymes expressed in plants that degrade cellulose. Endo-1,4-β-glucanase is mentioned only as one of a laundry list of enzymes that, in theory, could be used to alter plant polysaccharides. (See Col. 4, lines 23-52 of the '375 patent) There is no teaching or suggestion as to how to express endoglucanase to overcome the prediction that overexpression of cellulose in a cellulose containing plant would be adverse. Given the prediction that cellulose degrading enzymes could be harmful to a cellulose containing organism, one would not be motivated by the disclosure of Van Ooyen to express a glucanase in a spatial or temporal manner. Lack of motivation can also be found by the fact that while microbial glucanases were well known in the art, no attempt to express microbial glucanases in plants can be found until the present application, even though other microbial enzymes, for example the microbial amylase expressed in a plant by Van Ooyen, were expressed in plants.

Given the disclosure in Van Ooyen, there would have been no motivation for one skilled in the art to modify the invention of Van Ooyen to express a β-1,4-endoglucanase in a spatial or temporal manner as presently claimed.

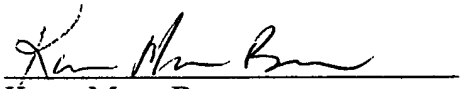
Applicants submit that the currently pending claims overcome this rejection and request its withdrawal.

CONCLUSION

Applicants point out that the above remarks and current claims overcome the rejections. Reconsideration of the application and allowance of all pending claims is earnestly solicited.

Should the Examiner wish to discuss any of the above in greater detail or deem that further amendments should be made to improve the form of the claims, the Examiner is invited to telephone the undersigned at the Examiner's convenience.

Respectfully submitted,



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